Environmental Security:
Toward a Framework for Naval Bases

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Executive Summary

Environmental security is a complex term which identifies a nation or region's stability using an analytical lens to focus on environmental change, human security, and national security. It is used to assess and promote social, economic, and political stability while adapting to environmental change (About Environmental Security, n.d.). As environmental changes and natural disasters are likely to increase due to climate change, the U.S. Navy can better meet its mission by proactively addressing environmental security concerns. Both domestic and international naval bases will be vulnerable to environmental change, including extreme heat, storms, and sea level rise, and therefore prone to weakened environmental security in the neighboring communities and regions, making unrest and conflict more likely. This analysis considers the addition of an environmental security framework to U.S. Navy natural resource management to analyze and assess the environmental security of naval bases.

Introduction

Environmental security encompasses the connection of environmental change, human security, and national security. A nation-state becomes environmentally insecure when an environmental change is destructive enough to weaken the economy, political stability, quality or quantity of natural resources, and the status of military installations (Barnett, 2019). The resulting exposed national security hinders a nation's ability to protect itself. This is exacerbated by human security which is threatened when a community is unable to manage the normal stresses to their needs, rights, and values.

Traditionally when discussing national security, the focus is on visible, tangible threats (Schoonover, 2021). Environmental security considers those dangers to national security that are global environmental changes or impacts exacerbated by these changes. Environmental changes include the effects of climate change, extreme weather, ocean acidification, coastal erosion, natural disasters, depletion of natural resources, and water crises. These are considered unseen, obscure or "actorless" challenges because there is no clear culprit, yet they have the potential to greatly sway the state of a nation. Depending on the location (among other factors), these environmental changes can take a great toll on that nation's existing national security and governance and economic stability.

The Navy has seventeen international installations which are already subject to various visible threats, and the status of their environmental security is also at risk (U.S. Navy, n.d.). An international naval base or installation is generally more vulnerable to counterattacks than a domestic installation. If a natural disaster strikes at home, resources and aid needed can usually be delivered more quickly and governance and infrastructure may be more stable. With environmental change at international installations, there may be a greater risk to security and stability, especially at coastal installations that face greater ecological fluctuation.

There is currently no existing environmental security framework or plan for naval bases or installations. Adding an environmental security framework to existing management of bases and installations would reveal vulnerabilities due to environmental change and empower a more proactive approach toward foreseeing and preventing future conflict.

The Navy and Environmental Security

Although there is no mandate for the Navy to integrate environmental security concerns, the Biden Administration has called for proactive climate policy in the United States government,

including the Department of Defense (DoD). By issuing the Executive Order on Tackling the Climate Crisis at Home and Abroad, President Biden placed climate change at the center of U.S. foreign policy and national security (US Government, 2021). In section 103, the DoD is instructed to review the implications of climate change on national security, and to incorporate findings into future planning, modeling, simulations, documents, processes, and analyses.

Under federal law (10 USC 2864), all major military installations must have a Master Plan. DoD Instruction 4165.70, Real Property Management, establishes the requirement for installation Master Plans. In addition, DoD Directive 4715.21, Climate Change Adaptation and Resilience, calls for the integration of climate change considerations into plans and operations. While other directives, executive orders and legislation exist for addressing environmental change and planning for installations, the combination of EO 14008 with the DoD planning and resiliency goals paves the way for consideration of environmental change and environmental security as a factor in meeting the Navy's mission.

Existing Frameworks

Two existing environmental security frameworks were analyzed to evaluate their purpose and utility for the Navy to address these issues at naval bases. Each framework has helpful tools that lend themselves to the development of an environmental security framework for the Navy.

Environmental Security Assessment Framework (ESAF)

The Foundation for Environmental Security & Sustainability (FESS, n.d.) developed the ESAF to assess national and subnational regions, natural resource sectors, and ecosystems. The goal of the ESAF is to provide a uniform framework for analyzing different countries and regions (Environmental Security Assessments, n.d.). As well as to inform policymakers, establish policy priorities, and aid the development of effective, sustainable programs.

ESAF is completed through a nine phase process, in which it begins with a baseline profile where the politics, economics, social structure, foreign relations, and ecosystem of a region are researched. Qualitative and quantitative data are then examined to determine issues, sectors, and resources that are crucial to stability; these focused issues are referred to as critical concerns (CCs). CCs are analyzed further through assessments, interviews with experts, and meetings with the local community to gauge relevance. Three scenarios are analyzed to determine the range and severity of potential outcomes, as well as their probability. ESAF concludes with an assessment report that includes all findings and recommendations for the local government and international and private sector entities.

This framework has been used in six countries and is useful in providing a concise report to achieve initial ESAF goals to promote environmental security.[1]

Ecological Security Matrix

The ecological security matrix was developed by a team at the Council on Strategic Risks and reported in The Security Threat that Binds Us report (Schoonover, 2021). Researchers conducted a survey to assess ecological security. The report offers findings and policy recommendations for U.S. national security agencies. Environmental security was addressed by analyzing actorless

[1] Environmental security assessments have been completed in Nepal, the Dominican Republic, Uganda, Sierra Leone, the Philippines, and Ethiopia. https://www.fess-global.org/ESAF.cfm

threats, like infectious disease outbreak, pandemics, and intensified natural disasters to assess their impact on human, national, and global security (Schoonover, 2021, p. 6).

Fifteen socio-ecological stress factors and nine security outcomes were examined. The relevance and severity of each stress factor and outcome were surveyed by 220 experts in academia, government, and non-governmental agencies (Schoonover, 2021, p. 100). *Figure 1* contains the average results of the survey. The table deciphers which socio-ecological stressors are likely to cause the most damage and which security outcome is most prone to threats (Schoonover, 2021, p. 103). It also visually depicts the complexity of environmental security while focusing users on policy recommendations and proactive changes that can ensure an environmentally secure region.

Figure 1: Weighted Mean for the Severity of Socio-ecological Stresses on Security Outcomes[2]

Weighted Mean (Severity)	State Conflict	Political Instability	Effects on Militaries	Global Health	Human Insecurity	Nonstate Powers	Disruptive Migration	Economic Harm	Rule of Law
Water Scarcity	4.2	4.1	3.6	3.7	4.4	4.1	4.6	4.4	3.6
Poor Water Quality	3.4	3.5	3.2	3.4	4.5	3.7	4.6	3.7	3.3
Wildlife Trafficking	2.6	2.8	2.4	3.4	4.2	3.4	3.2	2.4	3.5
Human-Wildlife Interface	2.7	2.8	2.6	4.1	4.3	3.4	3.3	2.4	2.7
Illegal Logging	3.1	3.3	2.5	3.7	3.7	3.8	3.5	3.2	3.4
Deforestation	3.4	3.6	2.5	3.6	4.3	4.1	3.9	3.7	3.2
Illegal Fishing	3.8	3.7	2.9	3.7	2.8	3.9	4.0	3.4	3.3
Unsustainable Fishing	3.8	3.8	2.9	3.5	3.2	4.3	4.2	3.4	3.0
Harm to Regulating ES	3.6	4.0	3.2	3.5	4.2	4.2	4.4	4.2	3.5
Harm to Material ES	3.8	4.1	3.1	3.6	4.0	4.2	4.3	4.2	3.6
Harm to Nonmaterial ES	3.0	3.3	2.4	2.9	3.2	3.1	3.3	3.0	3.1
Food Scarcity	3.6	4.0	3.2	3.5	4.0	4.3	4.3	4.1	3.5
Poor Food Quality	3.8	4.0	3.1	3.6	3.9	4.3	4.2	4.2	3.5
Extinctions	3.3	3.6	2.9	3.3	4.2	3.9	4.2	3.5	3.2
Mass Mortality Events	2.9	3.2	2.3	3.1	3.8	3.6	3.6	3.1	2.6

[2] Rows represent the socio-ecological stress factors and the columns the security outcomes. Socio-ecological stress factors were compared with the respective security outcomes to be given a ranking of 1-5 (5 meaning more severe). Average scores are shown in the table, and the 15 most severe are shaded red and the 15 least severe are shaded yellow. This chart reveals which ecological stress factors are the most detrimental and which security outcomes are most at risk.

Preliminary Environmental Security Framework

Taking elements from these two frameworks, a composite framework is proposed to best address environmental security at naval bases and determine how the Navy should assess and manage risks. The proposed framework has six phases: baseline info and gaps analysis, data collection, data analysis (qualitative and quantitative), ecological security matrix, test findings, and identify critical concerns (CCs) and remedial actions.

I: Baseline Info & Gaps Analysis

In Phase I, staff will begin by identifying the region to be analyzed whether it be a naval base, military installation, domestic or international location. Next, they will research the given area's economy, political standing, foreign relations, geography, and the ecosystem. Discerning the current management plans, legislation, and executive orders are also important at this stage. The collected baseline information will be the first step in determining what CCs could be relevant and destructive (Environmental Security Assessments). Staff will also complete a gaps analysis where the status of practices can be compared with the desired outcome.

II: Data Collection

Phase II focuses on baseline information about crucial issues, sectors, and natural resources to determine what areas may be vulnerable. Data can be gathered through interviews with local personnel, naval workers, and relevant departments and groups to get a first-hand account on the location's status. They will also collaborate with people who will endure the environmental stresses and gain a clear visual of what the state of the region looks like. This phase will further the assumed CCs from phase I.

III: Data Analysis

In Phase III, staff will analyze qualitative and quantitative data found from phases I and II and then assess possible implications of the identified CCs and determine which are truly critical concerns. Actual CCs are determined by analyzing what environmental changes will lead the identified location (region, city or community) to be environmentally insecure.

IV: Ecological Security Matrix

Phase IV includes conducting a survey to include the identified CCs for the location and potential security outcomes (Schoonover, 2021, p. 100-103). The survey will be sent out to relevant leaders and experts in the identified location. It is important to send the survey only to constituents from the location so that the answers are based on the same place. Once the survey is completed, staff should insert the results into a table similar to the example seen in *Figure 1*.

V: Test Findings

In phase V, the CCs are ground-truthed through a tabletop exercise (TTX). The TTX will help determine the accuracy of the CCs and determine plausible security outcomes. Depending on the outcomes, staff can move to Phase VI or revisit earlier phases.

VI: Prioritize Critical Concerns (CCs) & Remedial Actions

Phases IV and V deliver a strong conclusion as to what the priority CCs are in a given location. In phase VI, the CCs are confirmed, and remedial actions are reviewed to combat the concerns. Remedial actions can range from a proactive change to offset a potential security outcome to management plan revisions or new policy recommendations (Schoonover, 2021, p. 6-11).

Framework Example: Naval Base Guam

The study used Naval Base Guam as an example for how the environmental security framework might be applied and potential limitations to its use in certain locations. Naval Base Guam was chosen because it is susceptible to many effects from climate change, has valuable environmental data and an existing submerged lands management plan.

I: Baseline Info & Gaps Analysis

Guam is an island in the Pacific and a U.S. territory. Guam has significant coral reef ecosystems, which play a vital role in maintaining healthy waters, protecting against storms, and supporting the economy (Characterizing Submerged Lands around Navy Base Guam, CNMI, 2019). The two main drivers of Guam's economy are tourism and national defense (Ruane et al., 2019). Tourism is primarily focused along the coast and in its natural environment, involving activities like scuba diving, wildlife viewing, parasailing, charter boat fishing, dinner cruises, and beach combing (U.S. Navy Region Marianas, 2007). These economic drivers are at risk of environmental change from a variety of factors related to climate change.

Naval Base Guam is located at Apra Harbor, and there are existing plans in place to manage the area. (See *Figure 2* for a map of the area.) The current natural resource management plans include the Integrated Natural Resources Management Plan (INRMP) and the Guam Submerged Lands Management Plan (SLMP). The INRMP was developed in 2012 to provide restoration and enhancement of habitats for endangered species, while ensuring accomplishment of the military mission (Joint Region Marianas, 2012). The Navy operations that occur at Apra Harbor include critical mission requirements, operational fleet support, shore-based support, and training exercises including beach landing sites, field exercises, and deepwater mine countermeasures (Joint Region Marianas, 2012, p. 58). The plan also includes data on the endangered green and hawksbill sea turtles, marine mammals, and invasive species that require further research at the Naval Base. The Guam SLMP was created in correlation with the INRMP to analyze the status of naval submerged lands at Guam and the status of biodiversity (U.S. Navy Region Marianas, 2007). This plan discusses potential risks to the environment and ecosystems in submerged lands while prioritizing the Navy's mission. Neither the INRMP nor the SLMP include management and planning through an environmental security lens. Integrating environmental security into planning at Naval Base Guam can integrate important ecological aspects into installation management for improved national security and regional stability.

Figure 2: Navy Submerged Lands on Guam[3]

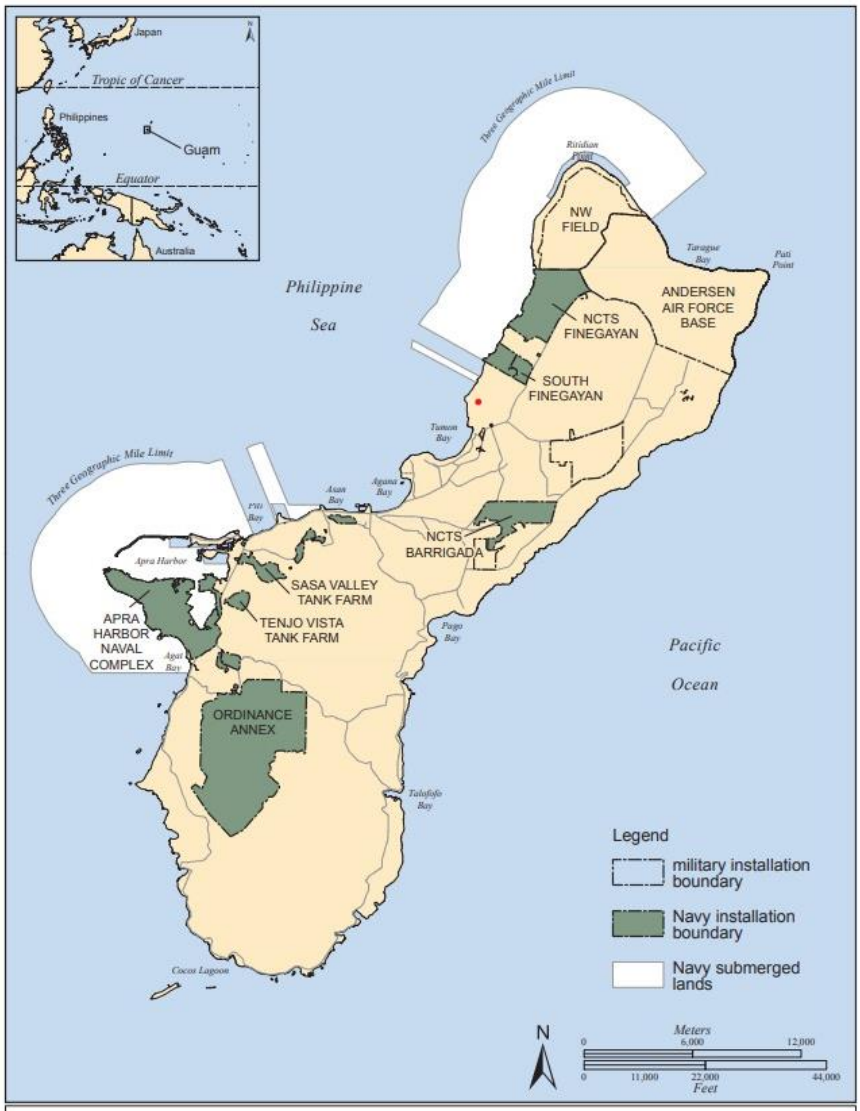

Figure 2-1
NAVY SUBMERGED LANDS ON GUAM

As U.S. territory, Guam complies with U.S. legislation and executive orders. An influential Executive Order that plays an active role in the management at Naval Base Guam is EO 13089: Coral Reef Protection (US Government, 1998). EO 13089 clarifies that federal agencies are required to protect U.S. coral reef ecosystems and are only allowed to ignore this Executive Order during war, a time of national security or emergencies to human safety, marine environment, or man-made military structures. The order also directs federal agencies to research, monitor, manage, and restore affected ecosystems. Laws and policies like this can inform the integration of

[3] This map shows where Naval Base Guam at Apra Harbor is located and displays the water and land that is owned by the Navy (U.S. Navy Region Marianas, 2007, p. 15). Navy owned water is shaded white, and the Navy owned lands are shaded in green.

environmental security into the planning framework for Naval Base Guam, especially given the potential environmental changes to coastal communities from sea level rise, storm surge flooding, coastal erosion, increased water and surface air temperatures, ocean acidification, extreme weather, and water crises (Fleming et al., 2018). These known potential coastal environmental changes will be identified as the CCs.

Phase II: Data Collection
Island communities are especially vulnerable to the identified CCs stated in phase I (Fleming et al., 2018). The CCs can impact the safety of fisheries, tourism, human health, public safety, and local ecosystems. As coastal ecosystems and properties are degraded, stability of the local community, health and economy are affected.

Like many bases, Naval Base Guam would be susceptible to a physical threat in the event of extreme storms or significant sea level rise. Interviews with local and relevant personnel on Naval Base Guam are recommended to get first-hand accounts on the state of the ecosystems of Apra Harbor, other management plans, and existing plans involving environmental change. Here, the SLMP and INRMP are assessed to determine how environmental change and natural resources are currently addressed. Phase I revealed that the two existing management plans do not proactively address environmental change and risks to the Naval Base.

Ecological research conducted throughout Guam can be utilized in this phase. A 2016 NOAA report addressed the overall coral reef resilience to climate change in Guam (Maynard et al., 2016). Twenty coral reef ecosystems around the island Guam were evaluated, and then overall reef resilience to climate change was assessed. Of the twenty coral reef ecosystems evaluated, four sites fall within the bounds of Naval Base Guam (Maynard et al., 2016, p. 6). The research completed by NOAA also incorporates resilience-based management which "developed to overcome the challenges of supporting ecosystem resilience in this era of rapid change" (Maynard et al., 2016). The analysis of the four local sites, the incorporation of resilience-based management, and ongoing research would greatly aid in addressing CCs of environmental security specific to Naval Base Guam.

Phases III - VI: Data Analysis, Ecological Security Matrix, Test Findings, and Identify Critical Concerns & Remedial Actions
These next phases of the preliminary environmental security framework would gather further targeted research through interviews and a survey. The focused directives will allow accurate analysis of the overall environmental security of Naval Base Guam as well as determining what remedial actions will work best. These phases will develop a conclusion of the preliminary framework and help make necessary adjustments.

Conclusion
Over twenty years ago, the Army Environmental Policy Institute found that because "environmental security impacts national security and troop safety, the Army needs to participate in the development of this emerging international concern." (Glenn, et al, 1998 at v.) That report found that it was important to identify the appropriate military role in matters of environmental security. With the increase in environmental change and greater understanding of the correlation between environmental health and stability, one appropriate role is to integrate environmental security into planning. At Naval Bases, integrating environmental security into installation planning can offer a more sustainable future and enable the Navy to better meet its mission.

Naval Base Guam is an ideal case study to test the development and utility of integrating an environmental security framework.

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